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Project Number N8856

Mr Curtis Frye
Remedial Project Manager
EFA Northeast, Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop 82
Lester, Pennsylvania 19113

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order No. 0849

Subject: Background Work Plan
Study Area 08, NUSC Disposal Area
Naval Underwater Warfare Center, Middletown Rhode Island

Dear Mr. Frye:

Enclosed you will find four copies of the Draft Final Work Plan for the Background Soil Investigations, prepared for the site referenced above. This work plan is a revision based on comments received from the USEPA and RIDEM on the draft version provided by TtNUS in March 2003.

Attached to this letter, you will find responses to the comments from RIDEM (Attachment A) and the USEPA (Attachment B) that necessitated the work plan revision. Comments from RIDEM were dated September 22, 2003 and those from the USEPA were dated September 23, 2003

If you have any questions regarding this material, please do not hesitate to contact me

Very truly yours,

Stephen S. Parker, LSP
Project Manager

SSP/rp

Attachment

c: K. Finkelstein, NOAA (w/encl. – 1)
K Keckler, U.S EPA (w/encl. – 3)
P. Kulpa, RIDEM (w/encl. – 4)
R. Machado, NUWC (w/encl – 2)
S McFadden, TAG (w/encl. – 1)
A Cerise, NSN (w/encl. – 2)
J. Stump, Gannett Fleming (w/encl. – 2)
J Trepanowski/G. Glenn, TtNUS (w/encl. - 1)
R. Sloboda, TtNUS (w/encl. - 1)
File N8856-3.2 (w/o encl.), N8856-8.0 (w/encl. - 1)

ATTACHMENT A
RIDEM Comments on Navy's Response to
Comments on the Draft Work Plan
Background Soil Investigation, NUSC Disposal Area
(Comments Dated September 22, 2003)

1. Section 1.1 Specific Investigation Objectives; Page 1-1, Whole Section.

This section of the work plan includes a discussion of the Site Remediation Regulations requirements for a background investigation. The discussion implies that if there are elevated levels of contaminants at the site and at neighboring areas remediation is not required. Presence of contamination on the site and or the neighboring area does not negate the need to address the contamination. Therefore, please remove this discussion from the work plan, as these statements concerning the application of the regulations are incorrect.

Evaluation of Navy's Response to Comments # 1, 5 & 6

The Navy has proposed collecting background samples in areas such as, golf courses and farms where the work plan acknowledges that releases have probably occurred. The Navy believes that these areas are appropriate since the Navy itself would not have been responsible for any similar past practices that may have contaminated the soils at the NUSC Disposal area Please be advised that property owners are responsible for contamination on their property even if the contamination occurred prior to them purchasing the property.

The Navy has also stated that it is not "possible" to locate any land in the area, which has not been contaminated by these practices. A number of background studies have been performed on Aquidneck Island, including two studies performed by the US Navy. In these studies it was possible to locate land, which had not been contaminated by past releases. Therefore please address the comments and propose alternate background sampling locations.

Response:

The Navy has proposed to collect samples, not where "releases" have probably occurred, nor in areas which are "contaminated", but where use of pesticides and herbicides are likey to have occurred, as similar to the subject site (refer to correspondence dated 8/28/03). This approach is valid and defensible.

Considering the position the state has taken on responsibility of contaminants found during this background investigation, and the ubiquitous nature of elevated levels of arsenic in the area, it seems unlikely that the Navy would receive permission to sample surface soils on any privately held property in the area. In case access is not allowed by the owners of the preferred background locations described in the work plan, the Navy would like to meet and discuss opportunities to collect soil samples on State – owned property on Aquidneck Island, which meet the criteria for use as background. Two parcels, one known as Nunes Farm in Middletown, and the other known as Oakland State Forest in Portsmouth, both contain soils similar to those at the site (Se, PmA, PmB, and Ma), and appear to have no history of use (other than agricultural and recreational) no history of development, nor history of releases there. These are likely to make good study areas for background soils at the site.

4. Section 2.2.1, Soil Types; Page 2-7, Paragraph 3.

The work plan notes that the soil adjacent to the streambeds in the same soil classification will be

hydric, as opposed to the non-hydric soils located further away from the streambeds. Accordingly, two background studies will be performed at the site, one for hydric and the other for non-hydric soils. These studies will entail the collection of twenty background soils samples for each soil type. The site does not lie in the flood plain of a large river. In fact the streams entering the site are small, and in some locations they can be jumped across. Further, disposal activities have resulted in nearly vertical slopes along sections of the stream, and overall the wetlands at the site itself are limited.

Therefore, the hydric soils at the site may not be significant enough to warrant a separate, intensive, background investigation, such as the one proposed in the work plan. Without site-specific information demonstrating the need to perform a separate background assessment, the Office of Waste Management does not concur with the proposed background study for hydric soils.

Evaluation of Navy's Response

The Navy has slated that it is their belief that there are enough hydric soils at the site to warrant this separate investigation. In support of this position the Navy should take the appropriate test on the site and up gradient soils to demonstrate that these soils are indeed hydric as opposed to non-hydric.

Response:

The Navy concurs, and a scientist trained in soil sciences and such differentiations will make that determination in the field.

5. Section 2.2.4, Definition of Study Boundaries; Page 2-9.

This section of the work plan includes a discussion of the site and the different areas where background samples may be collected. The work plan notes that the site and the proposed background areas were used for agricultural purposes, golf course, etc. The Navy notes that pesticides, herbicides and other agricultural chemicals were commonly and consistently used at these sites. Be advised that it is inappropriate to collect background samples from release areas. Therefore, all of the proposed background areas are inappropriate and the Office of Waste Management does not concur with the proposed locations and will not accept or review any reports based upon samples taken in these areas. The work plan should focus on non-release areas, that is, areas where pesticide, herbicides, etc were not used. The criteria of collecting samples in non-release areas were employed in the background studies performed at other sites on the base. Accordingly, the work plan should be modified and alternate sampling areas should be proposed.

Evaluation of Navy's Response

See response to comment No. 1.

Response:

The Navy does not propose to collect background samples from "release" areas. Refer to Navys response to Comment No. 1.

6. Section 3.2, Soil Sampling; Page 3-1, Whole Section.

The proposed soil sampling locations are not acceptable. Please submit alternative sampling areas

for review. Be advised that background samples should not be collected from release areas.

Evaluation of Navy's Response

See response to comment # 1.

Response:

The Navy does not propose to collect background samples from "release" areas. Refer to Navys response to Comment No. 1.

8. Section 5.0, Data Analysis and Statistical Testing; Page 5-1, Whole Section.

This section of the work plan discusses the statistical test that will be used to evaluate the data. Although not stated it is assumed that this evaluation will include results for standard statistical test. These test include, but are not limited to, the mean (geometric/arithmetic), median, mode, variance, range, minimum, maximum standard deviation, interquartile range, percentiles, variation, sum, count confidence level, skewness, and kurtosis. All of this information should be presented in table format as appropriate. In addition the sample results for a particular contaminant that the Navy is performing a background assessment on, will be depicted in tables in ascending order. The Office of Waste Management recommends placing the above statistical data below the ascending order values.

Evaluation of Navy 's Response

It appears that the Navy will provide the requested listed information. Please confirm

Response:

The statistical analysis will include calculation of the appropriate parameters, including, but not necessarily limited to, parameters noted above that are applicable to the evaluation of the distribution of the data.

10. Section 5.0, Data Analysis and Statistical Testing; Page 5-1, Whole Section.

This section of the work plan lists the different test that will be performed to analyze the background data set. Prior to performing these this analysis test for outliers should be performed on the data sets. This step is necessary as it may affect which sample locations are used in the background analysis.

Evaluation of Navy's Response

The Navy has stated that an initial screening test of four times the 75 quantile will be used to identify outliers. Once identified, a number of statistical tests will be performed. This initial screening may eliminate potential outliers from evaluation. Therefore it should be eliminated from the report. In regards to the test to be performed, the applicability of a particular test will depend upon the data distribution and other factors. Therefore, while it is appropriate to propose different test, final approval concerning the applicability of a particular test cannot be given until the actual data is presented. At that time a determination can be made as to whether the proposed test was appropriate or whether another test that was not initially proposed should be used.

Response:

The Navy concurs that applicability of a particular test will depend upon the data distribution and other factors. The data will be shared with the review parties prior to conducting the statistical tests; however, further discussion about testing at that time should be focused on unique aspects of the data and not general approach. The outlier screening step only assists in increasing the scrutiny of a particular data point. It will not prevent considering any data point for formal outlier testing but highlights data that might be affected by possible sources of systematic error or bias.

13.Section 5.0, Data Analysis and Statistical Testing;
Page 5-1, Last Paragraph.

This section of the work plan states that the *95* % UTL will be used to determine the background concentration. It is premature to state whether the *95* % UTL will be employed as the background concentration. The value employed will be based upon the data. Accordingly, the work plan should note that *95 %* UTL, the 80 %, the mean etc., may be used as a reference value for existing site date.

Evaluation of Navy 's Response

The Navy acknowledges that the 95 % UTL may not be applicable. Further, it is noted that the UTL can generate an unacceptable high false positive. The Navy has proposed conducting additional tests in support of the 95 UTL. The final value used in the background study will be based upon the data. At that time a decision will be as to whether, the mean, 80 %, 95 % values or some other value will be used. Proposing tests in support of one possible value, in this case the 95 % UTL, in lieu of other possible values, such as the mean, will bias the approach and is not appropriate. Therefore, the work plan should clearly state that the 95 % UTL, 80%, mean etc may be used as a reference value at the site.

Response:

The UTL itself is not an appropriate test when there are more than 3 data points subject to testing from the site. The false positive rate increases with the number of data points and using 3 data points the alpha level for the 95 % UTL is 0.14. Since statistical tests generally will involve considerably more than 3 site data points, use of the UTL test will be avoided, in agreement with current Navy guidance (2002).

ATTACHMENT B
USEPA Comments on Navy's Response to
Comments on the Draft Work Plan
Background Soil Investigation, NUSC Disposal Area
(Comments Dated September 23, 2003)

Comment 2

It is stated repeatedly *(e.g.,* Response to Specific Comment 2, and elsewhere) that the objective of the site sampling at SA-08 is to compare concentrations (possibly representing contamination due to site-related activities) in site soils to concentrations in upgradient and background soils near the site. It is clear that the Navy is not planning to include fill material (acknowledged to be present on site) in the background/upgradient sample set, but onsite fill will be sampled as part of the site investigation. In principle, EPA agrees that "...there are too many unknowns regarding the source of fill used for nearby development...to try to develop a separate data set..." for the fill. However, it will be critical to identify which site samples are from filled areas. Therefore, the on-site geologist who collects these samples should be advised to take careful notes.

Response:

The Navy concurs, and the scientists collecting samples will attempt to assure the soils are native through identification of a plow layer or other features.

Comment 9

This comment discussed the alpha level that should be selected for testing the hypothesis, Ho: $U_{background} \geq U_{site}$, which is Test Form I from USEPA (2000). As stated on Page *5-15* of USEPA (2000), the selection of an alpha level of 0.2 is the more conservative alpha level for this hypothesis. Conservative in this sense means that a site that is contaminated is correctly identified as contaminated.. Because Test Form I is already biased to accept that the site is within the range of background, a more relaxed alpha level is needed to ensure that sites that are contaminated are correctly identified. A site would not necessarily require remediation simply because a constituent is identified as occurring above background. Typically, this result only ensures that the constituent is included in the risk assessment. If the constituent is found to both be above background and pose unacceptable risks, then remediation may need to be considered. EPA recognizes that arsenic does represent a unique case because of its high slope factor. The Navy may want to consider performing geochemical comparisons of site and background data for arsenic as described in the Navy (2002 and 2003) background guidance for soils and sediment if it believes that arsenic detections are naturally occurring. Regardless, to ensure that potentially contaminated sites are correctly identified, EPA maintains that an alpha level of 0.2 should be used for hypothesis testing using Test Form I for this site.

The response indicates that the Navy will perform retrospective tests of power. EPA expect that if it is found that the power of a test is not adequate, the constituent being tested must be included in the risk assessment process. This procedure is needed in order to avoid the situation where a site, that is truly contaminated, is incorrectly identified as clean.

Response:

Navy respects EPA's recommendation and has carefully considered the implications, both benefits and detractions, of using an alpha level of 0.2 for contaminants that could be naturally occurring. In consideration of all factors, since the guidance suggests an alpha range of between 0.05 and 0.2, Navy has decided to use 0.05 for contaminants that could be naturally occurring because this represents a nationally-acceptable practice based on both guidance and established precedent, and because the alternative value of 0.2 would result in drastically inferior risk-benefit decisionmaking. Further discussions of the site-specific impacts of this approach are welcome once the draft data assessment has been completed and the statistical results are available for review.

While application of background tests using the 0.2 value for alpha would lower the minimum detectable difference (MDD) that can be seen between site and background data sets, in practice, only slight improvements to the MDD would occur, not enough to justify increasing the false positive rate from 5 percent to 20 percent. Using the equations presented in EPA guidance (2002, 1992), an analysis of the power of the t-test (for normal data) or Wilcoxon Rank Sum (WRS) test (for nonparametric data) shows that there would be very limited benefits by using the 0.2 alpha level. For the t-test, with 20 background and 20 site samples, and requiring a power of 0.9, using the traditional alpha of 0.05 that was proposed in the work plan yields a MDD of 0.94 standard deviation units, whereas an alpha of 0.2 would yield a MDD of 0.67, which is a very minor drop of 29 percent in the MDD considering the penalty of a 300 percent increase in false positive decisions.

For nonparametric data, applying the WRS test in this manner also would be of minimal benefit. With 20 background and 20 site samples, and requiring a power of 0.9, using the traditional alpha of 0.05 yields a MDD of 1.03 standard deviation units, whereas an alpha of 0.2 would yield a MDD of 0.72, which is a very minor drop of 30 percent in the MDD considering the penalty of a 300 percent increase in false positive decisions.

Comment 10

> Please note that it is very unlikely that a sample set with three or even six samples will be suitable for hypothesis testing. It is very likely, that the hypothesis testing for most constituents will not have sufficient power to accept the null hypothesis
> Ho: $U_{background} \geq \mathbf{U_{site}}$

Response:

> There will be at least 20 samples available for each candidate background data subgroup for hypothesis testing for the background study. The work plan will be clarified once all background locations and soil types have been agreed to.

Comment 12

> The response indicates that analyses of herbicides or algae are not necessary because they are "...not actionable on Navy property" even if they originate upgradient *(i.e.,* the golf course area) and may be considered 'background' warrants further discussion. EPA believes that herbicide and algaecide sampling is required and appropriate background studies should be performed. It is inappropriate to manage risk risks (or explain them away) before completing the sampling and risk assessments.

Response:

The need for remedial actions within an area to mitigate impacts from routine application of pesticides and herbicides is exempt under CERCLA. Because of this, the site-related samples were collected only for routine parameters and not for the special classes (algaecides/herbicides) noted above. Therefore, sampling and analysis for herbicides and algaecides in the background areas are not warranted because there would be no site data to compare to background. Note that there is no knowledge or expectation of these classes of contaminants to have been handled, processed, or disposed at the site in any manner except as a possible consequnce of routine applications and subsequent transport along overland migration pathways.

Comment 14

> This response indicates that parametric two-sample comparisons are still being considered by the Navy for constituents exhibiting data with a lognormal distribution. While the Navy may choose to run this type of test (for example a test on log transformed data), EPA maintains that only the results from hypothesis testing using nonparametric tests may be used to determine whether site data is within the range of background and eliminate constituents from further evaluation at this site.

Response:

While there is technical validity for using the log-transformed background tests when the distributions are truly lognormal, the Navy recognizes that there are problems in confidently interpreting the classification of data as lognormal. Erroneous interpretations involving log-transformed data were documented in data simulations performed by Singh (Lockheed, Las Vegas, contractor to EPA), which are discussed in EPA guidance pertaining to lognormal distributions (EPA, 1997). The 1997 EPA guidance does not forbid using lognormal transformations but cautions that misinterpretations can occur when normally distributed data with a few extreme high observations as outliers are mistakenly modeled with a lognormal distribution or when an environmental mixture of a normal distribution of background levels are overlaid with a different normal distribution of higher mean levels from a contaminated part of a site in a manner which generates an acceptable goodness of fit value when modeled incorrectly by a lognormal distribution.

The Navy will follow EPA's recommendation because there is an underlying basis for EPA's concern and the other statistical test (WRS) should provide adequate sensitivity in either case.

REFERENCES

USEPA, 2002. *Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites.* EPA 540-R-01-003, OSWER 9285.7-41, September 2002.

USEPA, 1997. *The Lognormal Distribution in Environmental Applications.* Office of Solid Waste and Emergency Response. EPA/600/R-97/006. December.

US Navy, 2002. *Guidance for Environmental Background analysis: Volume 1. Soil.* UG-2049-ENV.

US Navy, 2003. *Guidance for Environmental Background analysis: Volume II. Sediment.* UG-2054-EN V.